(54) **Video gaming machine**

(57) The machine provides a dramatic narration during which a player is invited to make choices by actuating player-operable controls, the outcome of each player choice, which is governed by chance, being shown by dramatic scenes which are part of the narration. The player choice may result in dramatic scenes on a screen (14) showing that the player has won a reward, has lost, or has his choice of a reward or an opportunity to make a further choice with the possibility of winning a higher reward. The individual outcomes are determined with the aid of a random number generator. In one embodiment, the random number generator functions by randomizing the output of a pseudo-random number generator. An auxiliary display may be provided using lamps to indicate game progress.
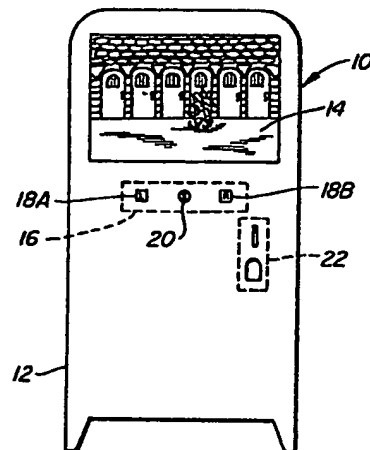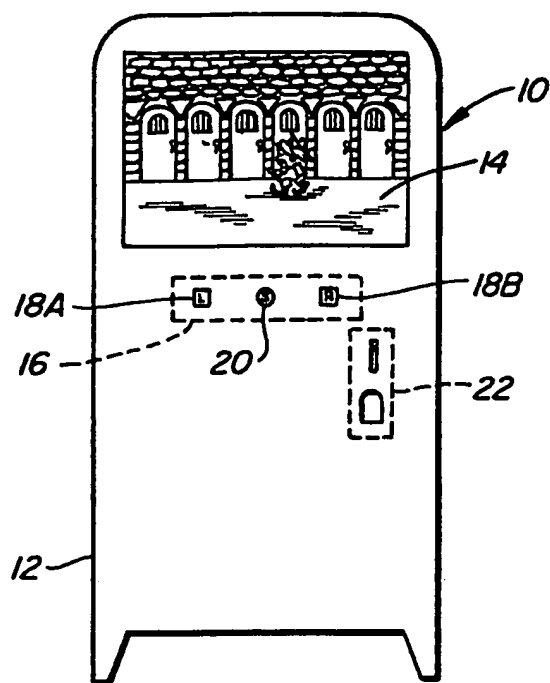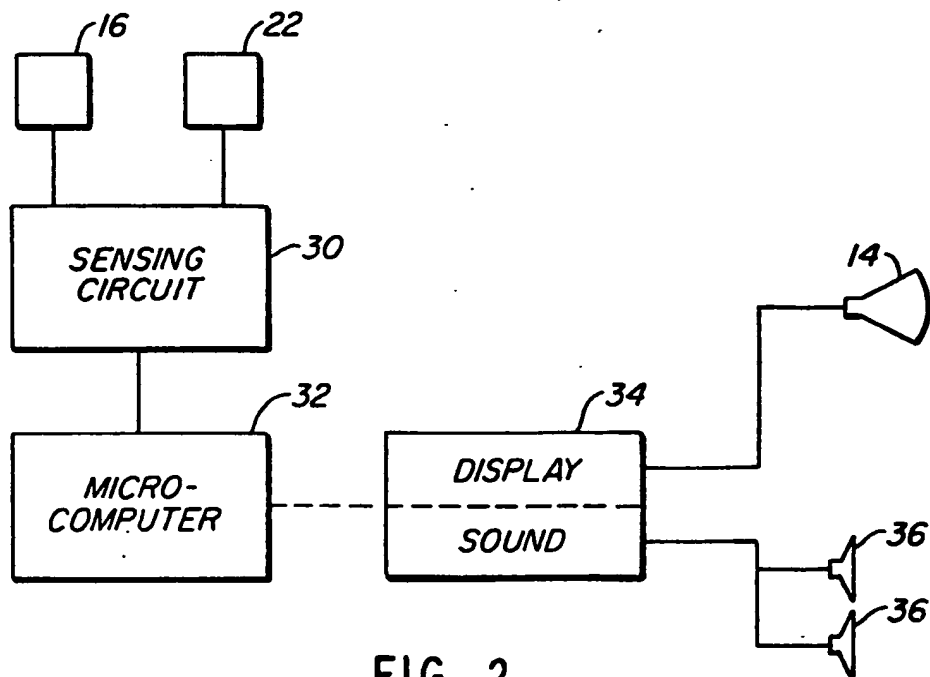
FIG. 1

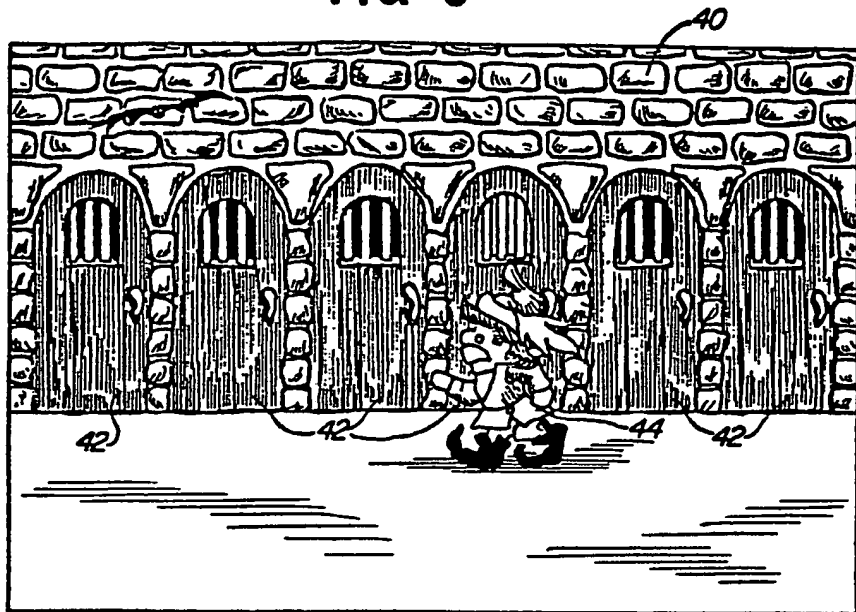GB 2 144 644 A

FIG. 1

FIG. 2

FIG. 3
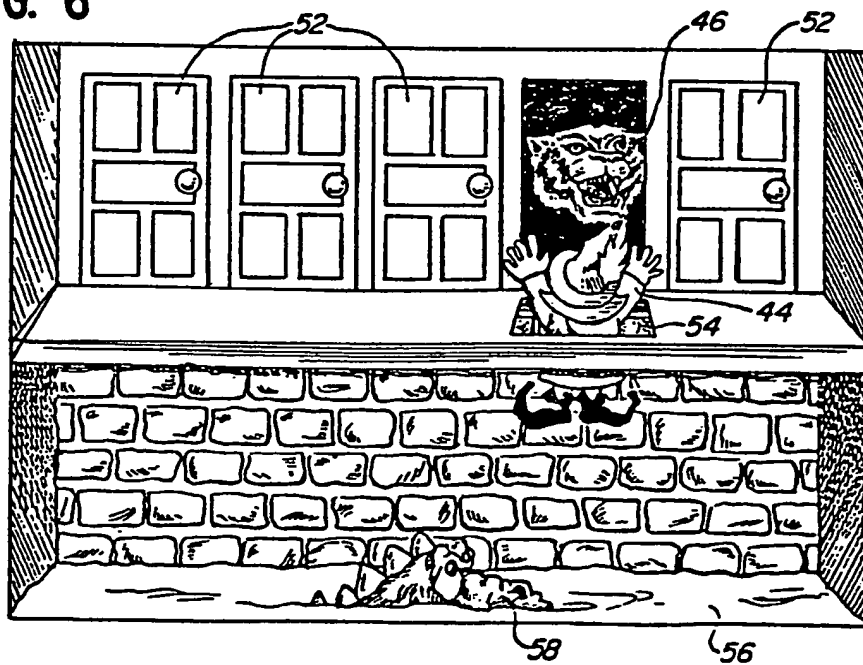

FIG. 4
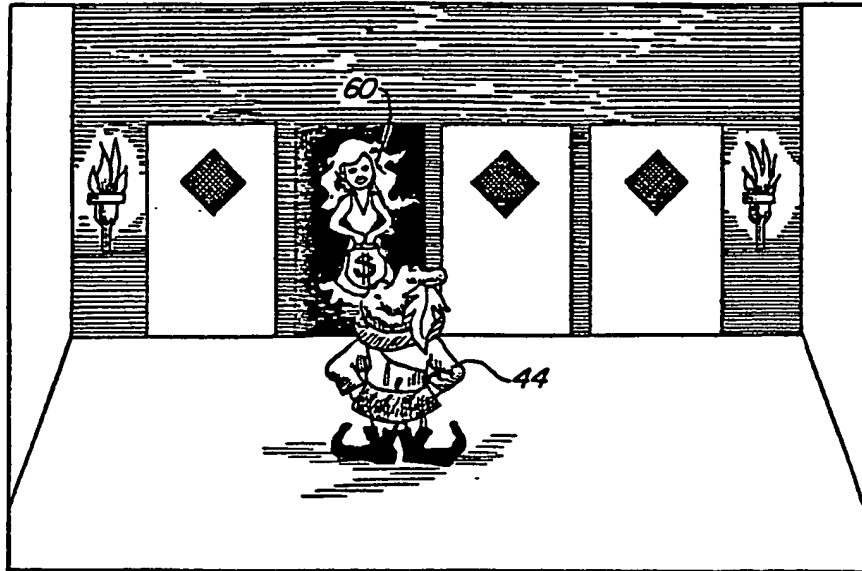
FIG. 5

FIG. 6

FIG. 7

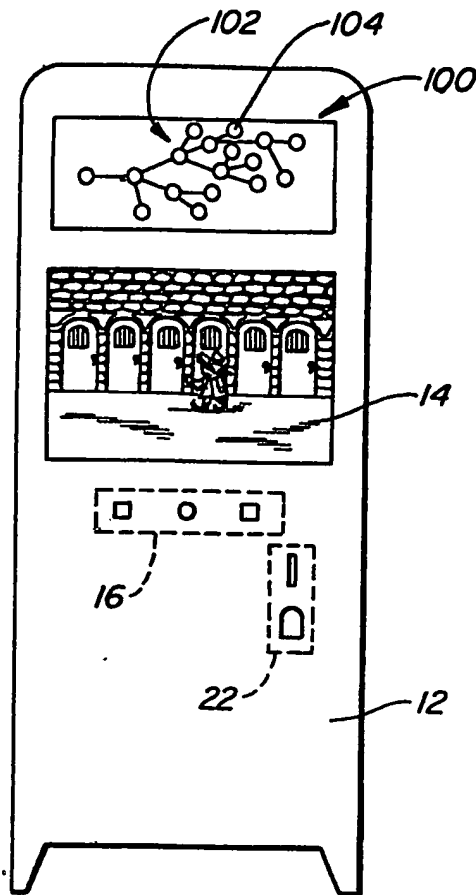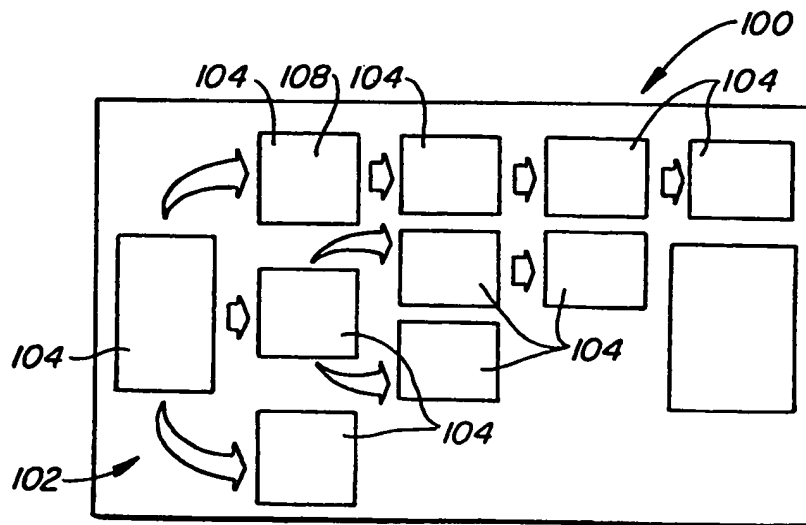## FIG. 8

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FIG. 9

FIG. 9A

SPECIFICATION
Video Gaming Machine

Background of the Invention
1. Field of the Invention
5   This invention related generally to electronic
video amusement games. It relates more
particularly to electronic video amusement games
having an element of chance and thereby being
suitable for gaming.

10   2. Description of the Prior Art
       A variety of video games are known that
present a player with choices having results
determined by chance. Such games are thereby
suitable for gaming purposes. Many such games
15   are modeled on gambling devices or gambling
games that were known prior to the development
of video game technology. Video slot machines,
poker, keno, and dog races are known and in use
today. A video slot machine mimics the behavior
20   of a traditional mechanical slot machine. Video
poker simulates the card game of poker. Although
such games are often commercial successes, they
do not exploit fully the capabilities of present day
video game technology.

25   Summary of the Invention
       The new technology in video games allows the
presentation of more imaginative displays than
have been used in the past. Such displays may,
for example, be used to provide dramatic
30   narrations as formats for games of chance.
Features of the present invention may accordingly
be embodied in a gaming machine which
provides a dramatic narration involving chance.
       A video gaming machine exemplifying such an
35   embodiment generally provides a video screen for
player viewing and controls for player operation.
Display circuitry provides means for displaying
scenes on the video screen. The scenes may
feature images shaped to resemble objects that
40   might be featured in a story or a drama. The
symbols therefore are narratively related objects.
       The player operable controls provide means by
which a player may designate one of the objects
as his preferred selection. The controls, providing
45   input to the display circuitry, cause the display to
indicate the player selection in accordance with
the unfolding story.
       Associated with the scenes on the video screen
are means for assigning the designated object
50   randomly to one of a plurality of classes. The
classes include at least a win class and a lose
class. The player is, of course, unaware of the
class assignment at the time of selecting an
object.
55   Means for responding to the object selection
by dramatic displays in accordance with the class
to which the object has been assigned are also
provided. Therefore, if the selected object is
assigned to a lose class, the means for
60   responding to the player's selection causes the
display means to display a scene symbolizing the
fact that the player has lost. After showing the

scene, game play is terminated. Correspondingly,
if the image selected is in a win class, then the
65   means for responding causes the display to show
a corresponding scene to the player symbolizing
the fact that the player has won. The victory is
then rewarded either with a prize or with an
opportunity to continue playing for a greater prize.
70   The win class may thus encompass several
subclasses. One subclass corresponds to a
response which provides an immediate reward to
the player in terms of money or tokens or other
prizes. A second subclass corresponds to a
75   response which provides the player with an
opportunity for continued play. If the selected
object is from the second subclass the player may
be rewarded by a sequence of scenes having a
dramatic relationship with the previous scenes
80   and culminating in a new scene where the player
is permitted to make a new selection with the
possibility of a greater reward. Alternatively, the
player may be permitted to take a smaller reward
and terminate the game at that point.

85   Brief Description of the Drawings
       Fig. 1 illustrates a video game machine
exemplifying features of the present invention;
       Fig. 2 is a functional block diagram of the video
game illustrated in Fig. 1;
90   Fig. 3 illustrates a dramatic scene on the
screen of the video game machine of Fig. 1 during
player selection at a six door level;
       Fig. 4 illustrates a dramatic scene on the
screen of the video game machine of Fig. 1
95   resulting from player selection of a lose class door
at the six door level;
       Fig. 5 illustrates a dramatic scene on the
screen of the video machine of Fig. 1 resulting
from player selection of a win class door at the sic
100 door level;
       Fig. 6 illustrates a dramatic scene on the screen
of the video game machine of Fig. 1 resulting
from player selection of a lose class door at the
five door level;
105   Fig. 7 illustrates a dramatic scene on the
screen of the video game machine of Fig. 1
resulting from player selection of a reward class
object at the five door level;
       Fig. 8 illustrates a dramatic scene on the
110 screen of the video game machine of Fig. 1
resulting from player selection of a win class at
the two door level;
       Fig. 9 illustrates an embodiment of a video
game machine with an auxiliary display
115 exemplifying features of the present invention;
and
       Fig. 9A is a detailed illustration of the auxiliary
display in Fig. 9.

Detailed Description of a Preferred Embodiment
120   Referring more specifically to Fig. 1, a video
gaming machine 10 includes a cabinet 12
containing a video monitor with a screen 14 and
player operable controls 16. The player operable
controls include, respectively, left and right
125 switches 18A and 18B and a select button 20.

The cabinet also includes a pay in, pay out 22 for paying in and paying out money, tokens, or other indicia of value. Such pay in, pay outs in gaming machines are disclosed in U.S. Patent 4,238,147
5 issued to Lucero, *et al.* on December 9, 1980.

As shown in the functional block diagram, Fig. 2, the player operable controls 16, which may comprise potentiometers and switches, are sensed by a sensing circuit 30, such as are
10 disclosed in the referenced patent. The sensing circuit converts the electrical signals generated by the player operable controls into electrical signals suitable for input into a microcomputer 32 or other digital circuit. The pay in, pay out 22
15 similarly cooperates with the sensing circuit 30 to exchange digital signals with the microcomputer to indicate the receipt to cause the paying out of indicia of value. When the microcomputer 32 states the game in respose to such receipt it
20 proceeds in accordance with instructions in its memory to provide input to display and sound circuitry 34.

A video game exemplifying features of the present invention is constructed in the context of
25 the well-known story by Frank R. Stockton, "The Lady or the Tiger?" Game play is initiated when a player deposits money in the pay in, pay out 22. As may be seen with respect to Fig. 3, the opening scene on the monitor screen 14 features
30 images such as a picture of a wall 40 having sic doors 42 and a prince 44. The prince's image may be moved by operation of the left and right switches 18A and 18B to be positioned in front of any one of the doors. Operation of the select
35 button 20 then selects that door. The selected door is randomly assigned to a lose class or a win class. If the door selected is assigned to the lose class then, as illustrated in Fig. 4, the selected door appears to open and display a tiger 46 ready
40 to spring out and eat up the prince, ending the game. If the selected door is assigned to a win class as illustrated in Fig. 5, then the door appears to open and show a view of a hallway 48. A new scene is subsequently displayed featuring five
45 doors 52 in a wall, such as those illustrated in Fig. 6. At this time the display informs the player that he has alternatives. The player may terminate the game by operating the select button 20 during a designated time interval and receive a designated
50 reward from the pay in, pay out 22. Alternatively, he may continue playing by selecting a new door with the possibility of winning a larger reward.

If the player continues at the five door level his selection may fall into one of three classes. If the
55 door 52 selected is in the lose class, it opens to show the tiger 46, as illustrated in Fig. 6. At the same time a trap door 54 opens, dropping the prince into a moat 56 containing a crocodile 58, again ending the game. If the door selected is in
60 the win class, the door opens to show a view of a hallway, followed by a scene with four doors. The player is again given the alternatives of terminating the game with a designated reward or continuing play. Finally, if the door selected is in a
65 reward class, the door opens to show a lady

holding a bag of money 60 as illustrated at the four door level in Fig. 7. The player is then given a reward and the game ends.

The player who continues playing at the four
70 door level may, with luck and suitable choice of options, eventually arrive at a scene presenting only two doors. If he continues to play at this level, then as illustrated in Fig. 8 his choice results in the random selection either of the lady or of the
75 tiger in accordance with the dramatic context of the game.

It may accordingly be seen that a video gaming machine to be played by a player viewing a video screen and operating player operable controls
80 may comprise display means for displaying scenes including a plurality of images of narratively related objects on the video screen; desgination means operatively connected to the display means and responsive to the player
85 operable controls for player designation of one object of the plurality; assignment means for assigning the designated object randomly to one of a plurality of classes, including at least a win class and a lose class, and response means
90 operatively connected to the display means and the assignment means and responsive to the designation by displaying a scene narratively related to the preceding scenes and indicating a win if the designated object is in the win class,
95 and a loss if the designated object is in the lose class.

Other embodiments of the invention may includes more than a single display as in the example illustrated in Fig. 9. The example uses an
100 auxiliary display 100 to show the progress of the player through a maze 102 which is illustrated in the auxiliary display. The maze is shown to comprise interconnected rooms such as the room 104 depicted in the tree structure in Figure 9 and
105 shown in more detail in Fig. 9A. Each time the player passes through a door into a hallway such as the hallway 106 depicted in Figs. 5 and 9A he is shown to progress into a new room of the maze where he is faced with additional doors. The
110 player's progression from room to room in the maze may be shown by lamps, such as the lamp 108, which light up to show the player's position.

Random assignment of doors to classes is made with the aid of a random number generator
115 and a shuffle procedure. The shuffle procedure assigns n doors to j classes by first assingning the doors systematically to the classes. The doors are then relabled according to the order of digits in a random shuffle of the n non-repeating digits 1, 2,
120 ..., n. Algorithms for random shuffling are discussed in D. E. Knuth, *The art of computer programming*, Reading, Mass., Addison–Wesley (1981) pp. 139—141, incorporated herein by reference. Shuffle algorithm P, discussed at
125 length in Knuth, may be used in a preferred embodiment of the present invention.

Random assignment is exemplified in the context of the present invention by considering the assignment of four doors to classes such that
130 two doors are in the lose class, one is in the

reward class and one is in the win class. The fixed convention for systematic assignment will be to assign in the order: lose class, reward class, win class. Accordingly, denoting the doors by the
5 symbol D1 ...D4 ... the initial assignments will be:

D1=lose

D2=lose

D3=reward

10   D4=win

The integers 1, 2, 3, and 4 are then randomly shuffled. If the results of the shuffle is the sequence 2413, then the resulting assignment of the doors will be:

15   D1=lose

D2=win

D3=lose

D4=reward

Shuffling requires the use of a random number
20 generator. A known algorithm for generating pseudo-random sequences of numbers is the linear congruential method which is described in Knuth, pp 9—25, also incorporated herein by reference. However, the numbers generated in
25 this manner are not truly random, as explained in Knuth, but actually comprise a sequence that repeats itself after a sufficiently long time. Such repetitious sequences are undesirable in gambling games because an observer who watches the
30 game long enough can eventually detect the cyclical behaviour of the game and anticipate the choices made by the game.

Accordingly, provision is made to randomize the output of the pseudo-random number
35 generator. That is, a pseudo-random number generator using the linear congruential method can generate repeating sequences of apparently random numbers with a long repetition period as explained in Knuth, pp 9—25. A random number
40 generator of the present invention then chooses numbers randomly from the long repeating sequence.

Thus, to exemplify the principles of random number generation derivable from the present
45 invention, a linear congruential generator may generate a pseudo-random sequence of numbers according to the iterative equation:

$$X^{n}+1=(aX_{n}+c) \bmod m \qquad (1)$$
where
50                $$a=5^{15} \qquad (2)$$

and c is the 35 most significant bits of the 40 bit hexadecimal number 361962E9A0. The modulus is
$$m=2^{36} \qquad (3)$$

55   The constant c is odd and is therefore relatively prime with respect to m, which is necessarily even. At various times during the play of the game the microcomputer 32 program, filed on a microfiche as part of the present application, calls
60 a random number generator module to obtain a random number. When called, the microcomputer generates a sequence of four numbers using the linear congruential method algorithm. The four generated numbers are stored in sequence. The
65 random number generated is then chosen to be one of the four numbers according to the value of a variable contained in the microcomputer's internal memory.

Neither the order of magnitude of the constant
70 c nor its least significant byte is affected by this procedure. It may therefore be seen that c remains relatively prime with respect to the modulus m and the order of the cyclical length of the generated random numbers is unaffected. On
75 the other hand, the modulation of c is truly random because the current value of the counter depends upon the number of periods between successive actuation of the select button. Accordingly, it may be seen that the linear
80 congruential method begins generating a new and generally different cycle of pseudo-random numbers after each actuation of the select button.

It will, of course, be understood that modification of the present invention in its various
85 apsects will be apparent to those skilled in the art, some being apparent only after study and others being a matter of routine design. For example, the use of stories other than "The Lady or the Tiger?" to provide a game format would fall within the
90 teachings of the present invention. It is not necessary to the invention that the number of classes to which objects are assigned be limited to three. Game control and object assignment may be performed externally to an individual
95 game, as by a time-shared general purpose computer. It is also not at all necessary that random number generation be based upon sequences of numbers generated by the linear congruential method, or indeed, upon pseudo-random
100 sequences. Accordingly, the scope of the invention should not be limited by the particular embodiment and specific construction herein described, but should be defined only by the appended claims and equivalents thereof.

105 CLAIMS
1. A video gaming machine to be played by a player viewing a video screen and operating player operable controls, comprising:
display means for displaying scenes including a
110 plurality of images of narratively related objects on the video screen;
designation means operatively connected to said display means and responsive to the player operable controls for player designation of one
115 object of said plurality;
assignment means for assigning the designated object randomly to one of a plurality of

classes, including at least a win class and a lose class; and

response means operatively connected to said display means and said assignment means and
5 responsive to said designation by displaying a scene narratively related to said scenes and indicating a win if said designated object is in said win class, and a loss if said designated object is in said lose class.
10 2. A video gaming machine according to Claim 1 wherein said display means includes apparatus for generating a raster scan display on the video screen.

3. A video gaming machine according to either
15 of Claims 1 and 2, wherein said plurality of images includes a plurality of images at fixed locations on the video screen and at least one image that is movable with respect to said plurality of images at fixed locations.
20 4. A video gaming machine according to either of Claims 1 and 2, wherein said plurality of images includes a plurality of images of doors in an image of a wall.

5. A video gaming machine according to either
25 of claims 1 and 2, wherein said display means includes an auxiliary display for displaying the progress of the player with respect to a narration relating said narratively related objects.

6. A video gaming machine according to Claim
30 3 wherein said designation means, responsive to the player operable controls moves one of said at least one movable images into proximity of one of said plurality of images at fixed locations on said video screen to designate said one of the fixed
35 images.

7. A video gaming machine according to either of Claims 1 and 2, wherein said assignment means includes a random number generator.

8. A video gaming machine according to Claim
40 7 wherein said assignment means uses a shuffle procedure including said number generator for assigning said designated object randomly to one of a plurality of classes.

9. A video gaming machine according to Claim
45 8 wherein said plurality of classes includes a win class, a lose class and a reward class.

10. A video gaming machine according to Claim 9, wherein said response means includes means for permitting a player to transfer a

50 designated object from said win class to said reward class.

11. A method for presenting a video game having a video screen and an operable control to be operated by a player comprising the steps of:
55 displaying a scene including a plurality of images of narratively related objects on the video screen;

requiring the player to operate the operable control to designate one of said plurality of
60 objects, said designated objects being assigned to one of a plurality of classes including at least a win class and a lose class, and;

displaying a resulting scene responsive to the designation, the resulting scene indicating a win if
65 said designated object belongs to said win class, and a loss if said designated object belongs to said lose class;

said resulting scene being narratively related to the preceding said scenes.
70 12. A method for presenting a video game according to Claim 11 wherein said designated object is assigned to one of a plurality of classes by a shuffle algorithm.

13. A method for presenting a video game
75 according to Claim 12 wherein said shuffle algorithm includes the step of generating numbers in accordance with a linear congruential method.

14. A method for presenting a video game
80 according to Claim 13 wherein said step of generating numbers includes the step of choosing numbers at random generated by said linear congruential method.

15. A method for presenting a video game
85 according to Claim 14 wherein said step of generating numbers includes the steps of varying randomly the constant c used in said linear congruential method.

16. A method for presenting a video game
90 according to Claim 11 wherein the step of displaying a scene includes the step of providing an auxiliary display having lamps to mark the progress of a player during the game.

17. A video gaming machine according to
95 claim 1 and a method according to claim 11, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.